DOCUMENT RESUME

ED 368 311 HE 027 336

AUTHOR	Facione, Peter A.; And Others
TITLE	Are College Students Disposed to Think?
PUB DATE	Apr 94
NOTE	18p.
AVAILABLE FROM	California Academic Press, 217 La Cruz Avenue, Milbrae, CA 94030 ($10).
PUB TYPE	Reports - Research/Technical (143)
EDRS PRICE	MF01/PC01 Plus Postage.
DESCRIPTORS	Attitude Measures; College Freshmen; *College Students; *Critical Thinking; Graduate Students; Higher Education; Private Colleges; State Colleges; *Student Attitudes; Student Characteristics; Thinking Skills
IDENTIFIERS	*California Critical Thinking Disposition Inventory

ABSTRACT

This study explored the disposition of college students toward critical thinking. The California Critical Thinking Disposition Inventory (CCTDI) was given to 586 freshmen in 1992 at a selective, private, urban, comprehensive university. The CCTDI is comprised of seven scales to assess inquisitiveness, open-mindedness, systematicity, analyticity, truth-seeking, critical thinking, self-confidence, and maturity. Of these students, only 13 percent scored positively on all seven scales while the other 87 percent were disposed against at least one of the seven aspects of critical thinking. The most common profile among the sample was of the student who showed a positive disposition toward all six aspects except truth-seeking. Additional data sets were also obtained, one of 198 freshmen and sophomores at a selective, public, urban comprehensive university in California and a cross-departmental sample of undergraduates and graduates in a school of allied health at an open-admissions, public, rural, comprehensive university. As with the original sample, students were positive toward open-mindedness and inquisitiveness, weak in systematicity, and had a strong disinclination to truth-seeking. A detailed discussion of future research avenues is offered. (Contains 60 references.) (JB)

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ED 368 311

Are College Students Disposed to Think?

by

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AAHE Assessment Forum
Chicago, Illinois, June 1993

International Conference on Critical Thinking
Sonoma State University, Rohnert Park California, August 1993

College Teaching and Learning Exchange Conference
San Jose, California, October, 1993

American Educational Research Association
New Orleans, Louisiana, April 1994

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This paper summarizes and updates presentations on this research made under this title at various national conferences. Some parts of this paper are drawn from our related manuscript, "The Disposition Toward Critical Thinking," co-authored with Joanne Gainen. Some of the ideas and findings developed here are new and not contained in that manuscript. We gratefully acknowledge and thank Joanne Gainen, Nicole Ferguson, Sue Hammon, and Joanne Carter-Wells for their contributions to this research.

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The Consensus Definition of Critical Thinking

There is a characterological profile, a constellation of attitudes, a set of intellectual virtues, or, if you will, a group of habits of mind which we refer to as the overall disposition to think critically. Nearly a century ago John Dewey, in How We Think, expressed the priority and significance of these habits of mind as follows:

> "If we were compelled to make a choice between these personal attributes and knowledge about the principles of logical reasoning together with some degree of technical skill in manipulating special logical processes, we should decide for the former." (1933, p.34)

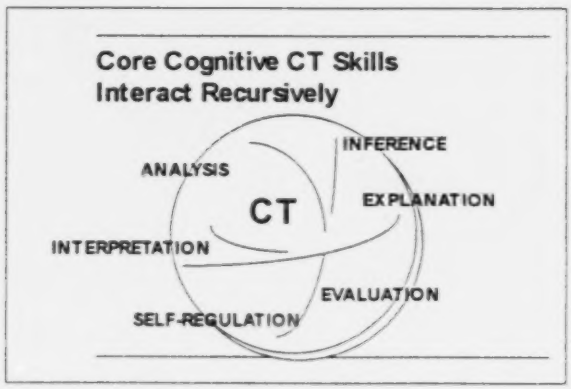
The purpose of the current research is to explore conceptually the disposition toward critical thinking, and to report preliminary empirical explorations concerning whether college students, display that disposition. Educators and scholars recommend that CT instruction in the K-12 and college curricula develop CT skills and foster in students the disposition to use those skills. Both the dispositional dimension of CT and its cognitive abilities dimension are reflected in theoretical characterizations of CT (Dewey, 1933; Scheffler, 1965; D'Angelo, 1971; Passmore, 1972; Glaser, 1985; Meyers, 1986; Mayfield, 1987; Kurfiss, 1988; Siegel, 1988; Browne & Keeley, 1990; Paul, 1990; Chaffee, 1992; Oxman-Michelli, 1992; Wade and Tavris, 1993; Gray, 1993). There is broad consensus among CT theoreticians that the educational goal is to prepare persons, particularly at the college level, who willingly and skillfully engage CT. In short, baccalaureate education should produce graduates who are willing and able to use their cognitive powers of analysis, interpretation, inference, evaluation, explanation, and self-monitoring meta-cognition to make purposeful judgments about what to believe or what to do (Paul, 1984; Ennis, 1985; 1987; Meleis, 1988; APA, 1990; Carter-Wells, 1992).

Efforts to define, teach, and measure CT have intensified throughout the last quarter of the century (Kurfiss, 1988; Norris & Ennis, 1989; Jones, 1993). In 1990, under the sponsorship of the American Philosophical Association, a cross-disciplinary panel completed a two-year Delphi project which yielded a robust conceptualization of CT understood as an outcome of college level education.

> "We understand critical thinking to be purposeful, self-regulatory judgment which results in interpretation, analysis, evaluation, and inference, as well as explanation of the evidential, conceptual, methodological, criteriological, or contextual considerations upon which that judgment is based... CT is essential as a tool of inquiry. As such, CT is a liberating force in education and a powerful resource in one's personal and civic life... While not synonymous with good thinking, CT is a pervasive and self-rectifying human phenomenon." (APA, 1990, p. 3)

Thus broadly conceived, CT was characterized as purposeful, self-regulatory judgment, a human

cognitive process. As a result of this non-linear, recursive process a person forms a judgment about what to believe or what to do in a given context. In so doing a person engaged in CT uses a core set of cognitive skills -- analysis, interpretation, inference, explanation, evaluation, and self-regulation -- to form that judgment and to monitor and improve the quality of that judgment. CT is non-linear and recursive to the extent that in thinking critically a person is able to apply CT skills to each other as well as to the problem at hand. For example, one is able to explain one's analysis, analyze one's interpretation, or evaluate one's inference (APA, 1990).



The CT skills emphasized by the Delphi panel are conceived of as broadly applicable, across disciplines, fields of practice, and human concerns. Yet, the Delphi panel emphasized that the successful application of these skills requires that one take into reasoned consideration the evidence, methods, contexts, theories, and criteria which, in effect, define specific disciplines, fields, and areas of human concern. CT skills are to be used to address problems, consider alternatives, and make decisions about what to believe or what to do in every area of human life. Similarly, the habits of mind which constitute the disposition toward CT can transcend and apply to all domains and permeates deeply into each domain.

The scholars and teachers who participated in this Delphi research determined that while CT *per se* was a form of cognition, it would be impossible to understand the teaching of CT without an appreciation of the characterological profile of the kind of individual one was trying to nurture. Hence, the consensus extended beyond identifying a core set of cognitive skills and sub-skills to the articulation of a description of the ideal critical thinker.

> "The ideal critical thinker is habitually inquisitive, well-informed, trustful of reason, open-minded, flexible, fair-minded in evaluation, honest in facing personal biases, prudent in making judgments, willing to reconsider, clear

> about issues, orderly in complex matters, diligent in seeking relevant information, reasonable in the selection of criteria, focused in inquiry, and persistent in seeking results which are as precise as the subject and the circumstances of inquiry permit." (APA, 1990, p. 3)

In 1993 the United States Department of Education funded a national survey of educators, employers, and policy-makers to determine their priorities with regard to the CT skills and dispositions appropriate for college graduates. In a clear example of building on prior research, the National Center for Postsecondary Teaching, Learning, and Assessment located at The Pennsylvania State University has utilized the APA Delphi conceptualization to undergird their survey instrument. The listing of CT skills, sub-skills, and dispositional attributes articulated in the APA Delphi research guides the structure and provides terminology for the survey instrument in this research project.

Thus, there is a growing consensus that a complete approach to developing college students into good critical thinkers must include the nurturing of the disposition toward CT. In the same place where it provided its definition of CT and the ideal critical thinker, the Delphi panel said,

> "Educating good critical thinkers means working toward this ideal. It combines developing CT skills with nurturing those dispositions which consistently yield useful insights and which are the basis for a rational and democratic society."

Some might argue that cultivating the disposition is necessary before implanting the skills, but a developmental perspective would suggest that skills and dispositions are mutually reinforced and, hence, should be explicitly taught and modeled together. In either case, common sense tells us that a strong overall disposition toward CT is integral to insuring the use of CT skills outside the narrow instructional setting. Motivational theory (Lewin, 1935) provides the theoretical grounds for the assumption that the disposition to value and utilize CT would impel an individual to achieve mastery over CT skills, being motivated to close the gap between what is valued and what is attained.

Empirically Refining the Concept "The Disposition Toward CT"

For the most part consideration of the disposition toward critical thinking has been little more than theoretical speculation, working assumption, anecdotal observation, and pedagogical discussion, rather than the subject of scientific investigation (Ennis, 1994; Facione, 1994; Salomon, 1994; Tishman, 1994). Few take either an empirical or theory-based approach to exploring the overall disposition to value and utilize CT. Few use empiricism to examine the relationship between that disposition and CT skills. Until recently exploration of this phenomenon, or any other of interest related to CT for that matter, has been

constrained by a dearth of instruments designed to measure the disposition toward CT. The California Critical Thinking Disposition Inventory (CCTDI) (Facione & Facione, 1992), which derives its conceptualization of the disposition toward CT from the APA Delphi Report, is the first such instrument. Building on the power of a relatively rare occurrence in research, a cross-disciplinary consensus on the dispositional description of the critical thinker, iterative empirical methods were utilized to derive a measure of the construct (Facione, 1992; Facione & Facione, 1993).

The CCTDI contains 75 likert style items and reports eight scores: a score on each of the seven scales (*Inquisitiveness, Open-mindedness, Systematicity, Analyticity, Truth-seeking, CT Self-confidence,* and *Maturity)* and an overall score of CT Disposition (derived from mathematically equal contributions from each scale). A score of 30 and below on any of the scales indicates consistent opposition or weakness in relation to the given attribute or characteristic, a score of 40 indicates minimal endorsement on average, and scores above 50 indicate consistent endorsement or strength of the given characteristic. (Facione & Facione, 1992). In developing the CCTDI, multiple pilot item prompts were written for each of the 19 Delphi dispositional phrases describing the ideal critical thinker. The resulting 250 prompts were screened by college level CT educators to identify possible ambiguities of interpretation. A selection of 150 pilot prompts were retained and incorporated into a preliminary version of the instrument which was then piloted at two comprehensive universities in the United States and one in Canada. Seventy-five items were chosen for retention in the final form of the instrument based on both their internal consistency and their ability to discriminate between respondents. Factor analysis supported retention of items within their various scales. (Facione & Facione, 1993).[1]

The seven CCTDI dispositional scales are discipline neutral, yet each can be readily interpreted within the liberal arts and sciences as well as professional disciplines. Below, each scale is described as it pertains to the outcomes of college level liberal education and college level professional preparation.

The Inquisitiveness scale measures *one's intellectual curiosity and one's desire for learning even when the application of the knowledge is not readily apparent.* The inquisitive student is curious, eager to acquire knowledge, desirous of being well-informed even when the applications of that knowledge is not immediately apparent, and inclined to ask "Why?" "What is that?" and "How does it work?"

The Open-mindedness scale addresses *being tolerant of divergent views and sensitive to the*

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[1] Alpha reliabilities for the seven individual scales in the initial pilot sample ranged from .71 to .80. The alpha reliability for the overall instrument, measuring the overall disposition toward CT, was .91. The instrument was later administered to two additional samples totaling 1019 freshmen college students. The alpha levels in the later samples remained relatively stable (ranging from .60 to .78 on the scales and .90 overall), thus empirically supporting the internal reliability of the instrument and each scale.

possibility of one's own bias. Another way to understand this passive sense of open-mindedness is to think of being tolerant. The open-minded student is tolerant of divergent views and concerned to monitor himself or herself for possible bias.

The Systematicity scale measures *being organized, orderly, focused, and diligent in inquiry.* No particular kind of organization, e.g. linear or non-linear, is given priority on the CCTDI. Organized approaches to problem-solving and decision-making are hallmarks of a thoughtful person regardless of the problem domain being addressed. Students with systematicity are inclined to approach questions and difficulties in focused, diligent and organized ways. These students are inclined to plan their approach to problems and to work on them in orderly ways.

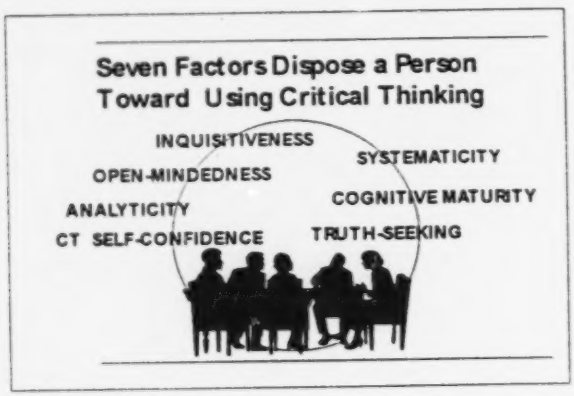
The Analyticity scale targets *prizing the application of reasoning and the use of evidence to resolve problems, anticipating potential conceptual or practical difficulties, and consistently being alert to the need to intervene.* Analyticity is a core disposition for the inquiring mind. Students with this characteristic are inclined to prize the precise and accurate application of reason and evidence, anticipate the consequences and implications of events and ideas, and be alert to opportunities to use thinking skills.

The Truth-seeking scale targets the disposition of *being eager to seek the best knowledge in a given context, courageous about asking questions, and honest and objective about pursuing inquiry even if the findings do not support one's self-interests or one's preconceived opinions.* Once a liberally educated person acknowledges a given set of facts to be the case or a given set of reasons to be relevant and forceful, that person is inclined to adjust his or her beliefs in accord with those facts and reasons. The truth-seeking student is one who remains receptive to giving serious consideration to additional facts, reasons, or perspectives even if this should necessitate changing one's mind on some issue. Perhaps the most difficult of the dispositional dimensions to cultivate, the truth-seeking student is inclined to ask honest, difficult questions, and to pursue reason and evidence wherever they lead.

The CT Self-Confidence scale measures the trust one places in one's own reasoning processes. *CT self-confidence allows one to trust the soundness of one's own reasoned judgments and to lead others in the rational resolution of problems.* An appropriate level of CT self-confidence, increasing in relation to one's maturity and in relation to one's mastery of CT skills, would be the desired developmental trajectory for all students. Rises and falls in CT self-confidence might suggest the progress of a person through developmental levels, with a rise of CT self-confidence indicating comfort at a given level of cognitive development and a fall in CT self-confidence resulting from the same cognitive dissonance which gives impetus to an upward movement. Whether an individual's level of CT self-confidence is warranted is

another matter, however. Some students under-estimate their ability to think critically, while others over-rate their CT ability.

The Maturity scale targets the disposition to be judicious in one's decision-making. The CT-mature person can be characterized as one who *approaches problems, inquiry, and decision making with a sense that some problems are necessarily ill-structured, some situations admit of more than one plausible option, and many times judgments must be made based on standards, contexts and evidence which preclude certainty.* The judicious student is inclined to look beyond naive simplistic, dualistic and absolutistic points of view. The judicious student is prudent in making, suspending, or revising judgments, and appreciative of the need to reach closure at times even in the absence of complete knowledge.



College Student Profiles

During Fall orientation week 1992, before college level instruction began, 587 new freshmen at a selective, private, urban, comprehensive university completed the CCTDI. A profile of the mean scores of this group is presented in Table 1. These were academically strong students, by such customary indicators as high school GPA in academic subjects (3.47) and SAT scores (1095 combined).

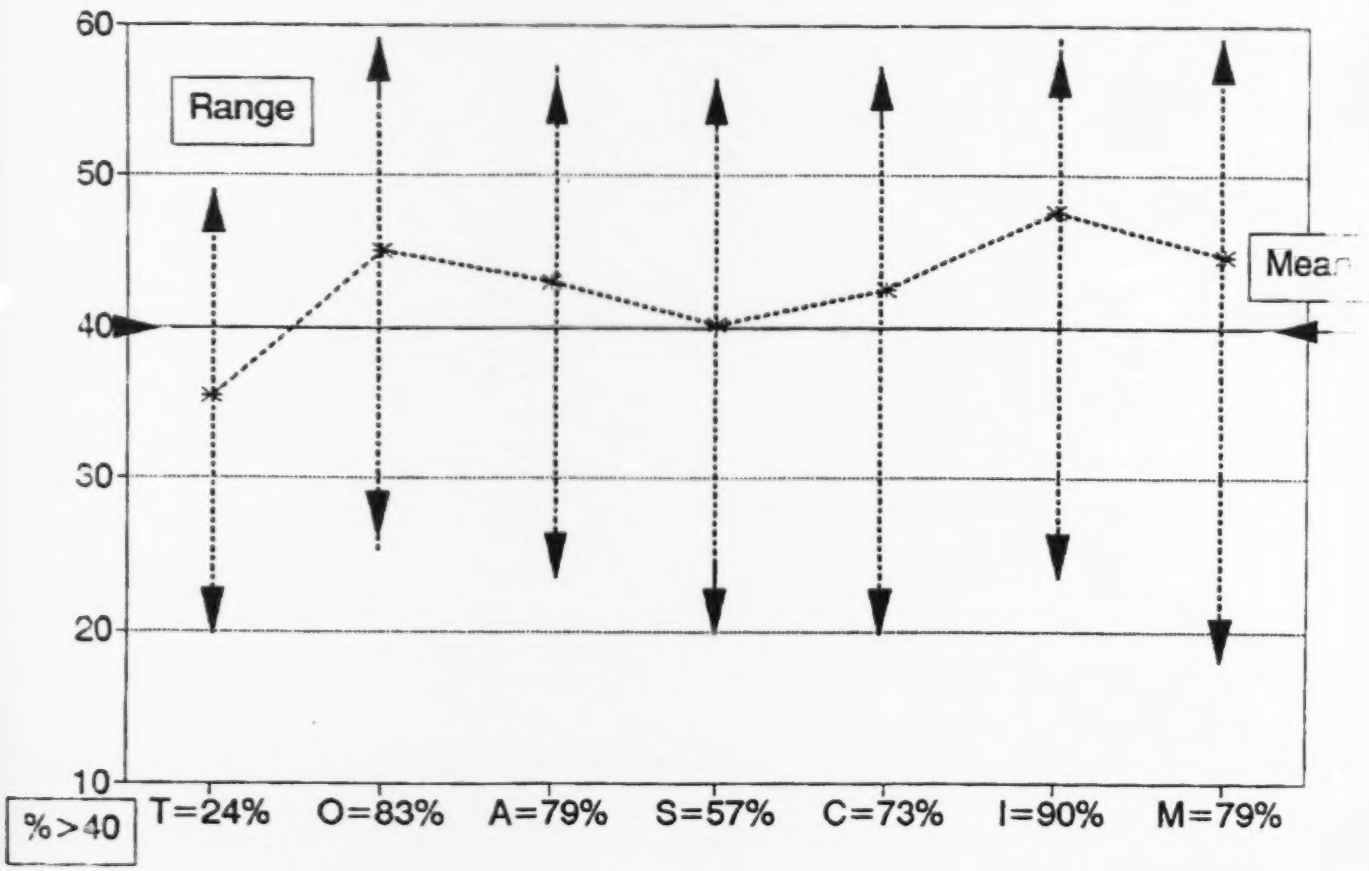
Table 1: Freshman Cohort -- Four-Year Private Comprehensive University (N=587)

Scale Name	Number of Items	Mean	Range	Std. D.	Std. E.	Alpha
Truth-Seeking	12	35.36	20-50	5.40	0.22	.72
Open-Mindedness (Tolerance)	12	44.96	26-60	5.73	0.24	.73
Analyticity	11	42.89	24-58	5.08	0.21	.72
Systematicity	11	40.30	20-57	6.55	0.27	.74
CT-Confidence	9	42.53	20-58	6.22	0.26	.78
Inquisitiveness	10	47.60	24-60	6.10	0.25	.80
Maturity (Judiciousness)	10	44.58	18-60	6.38	0.26	.75
TOTAL	75	298.22	184-377	27.36	1.13	.90

The CCTDI yields scores on the seven dispositional attributes, with a possible maximum mark of 60 and a possible minimum mark of 10. Marks above 40 indicate a positive disposition or endorsement. Marks below 40 indicate opposition to a disposition or a disinclination. The total CCTDI score is the sum of the scores on the seven scales, hence the total may range from 70 to 420, with marks above 280 indicating a positive overall disposition toward CT. We can infer from the two samples shown in Table 1 that it would be reasonable to describe freshmen college students as: (a) Positively disposed toward open-mindedness and inquisitiveness. (b) Their CT-confidence, analyticity, and cognitive maturity varies, but tends in the positive direction. (c) They are not inclined toward focus, diligence, and persistence in inquiry. (d) They oppose seeking knowledge which threatens their preconceptions or interests.

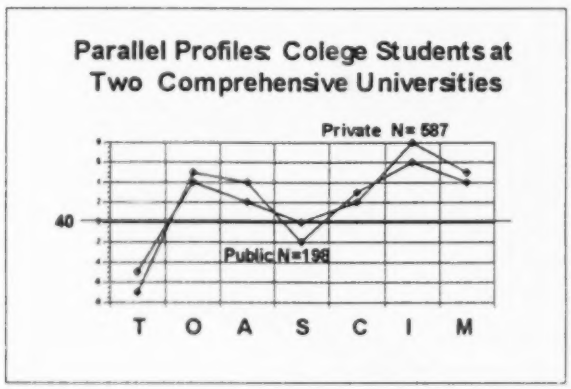
Table 2

Profile of 587 new freshmen on orientation day, private university



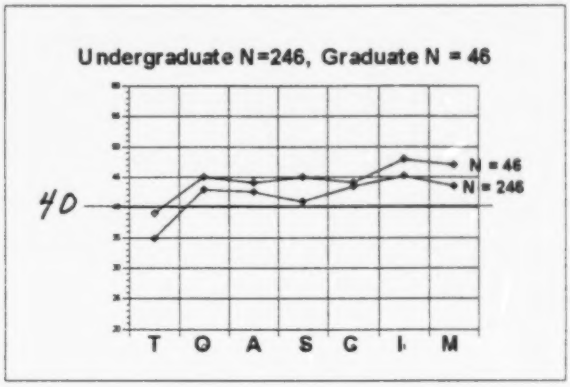
The sample described in Table 1 includes only entering freshmen who had not yet experienced college level instruction. Only 13% of these 587 new college students were positive on all seven CT dispositional scales of the CCTDI. The other 87% were disposed against at least one of the seven aspects of the overall disposition toward CT. The *most* common profile among the sample of 587 new freshmen was of the student who showed a positive disposition toward all six CT aspects *except* truth-seeking. 19% of the sample displayed that profile. Table 2 arrays graphically the ranges of individual scores on CCTDI scales among the group of 587 new freshmen. The mean total score of this sample on the CCTDI was 299. The percentages of students with scores over 40 on each of the seven given dispositional attributes are reported along the bottom. That only 24% of the students in this sample scored over 40 in truth-seeking challenges faculty with bringing the majority of students into the academic culture which values open inquiry, attends to reasons, and is moved by relevant evidence.

Repeated samples reinforce the picture of college students' disposition toward CT that emerged in that initial 1992/93 study. Later that year a sample of 198 freshman and sophomores was taken at a selective, public, urban, comprehensive university in California. The graphic below indicates how parallel the means of the two samples appear when profiled.

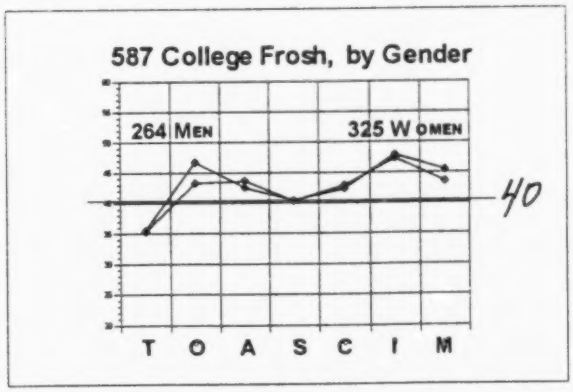


Another dataset was gathered in 93/94, this time a cross-departmental sample of undergraduates and graduates in a school of allied health at a open-admissions, public, rural, comprehensive university. These students came from programs as such as dance, physical education, nursing, and physical therapy. The means for undergraduates and graduates are displayed below. The profile of the graduate students is stronger in each dimension, which may reflect genuine growth or which may be an artifact of selection to graduate school. The undergraduate data has not been disaggregated by class level due to small

sample sizes. As with the earlier samples, and as was evident in the CCTDI validation studies as reported in the CCTDI Test Manual college students display positive inclinations toward open-mindedness and inquisitiveness, weakness in systematicity and a strong disinclination toward truth-seeking.

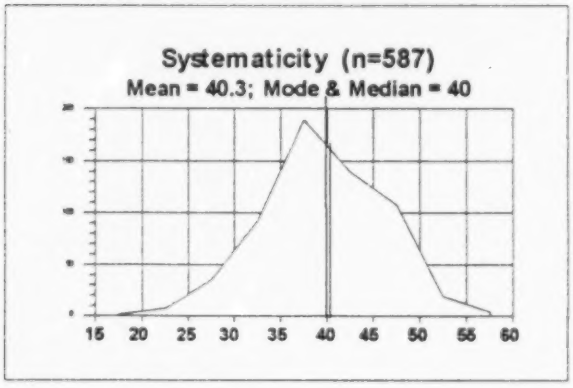


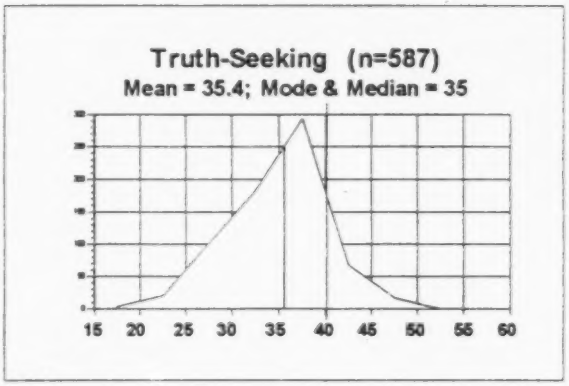
The data on the freshman sample of 587 was disaggregated by gender. Considered by gender, total CCTDI scores did not differ significantly in either of the samples tested. Yet small, but statistically significant differences, were observed between the means for the 324 women and the 262 men on three of the dispositional attributes scales: Analyticity ($p<.043$), Open-Mindedness ($p<.002$) and Maturity ($p<.001$). Women were more disposed toward being open-minded and cognitively mature, whereas men were statistically more inclined toward being analytical. Preliminary conjectures attribute the differences in these two samples either to developmental differences in young adult men and women or to their perceptions of their social-gender roles. The possible implications for college level pedagogy and curricular development are yet to be explored.



An over-emphasis on statistical differences in the scales scores might be less beneficial to educators than focusing attention on the important finding that there is no difference between the means for women and for men in the overall disposition toward CT. In fact, the overall profiles on the CCTDI scales by gender appear to be comparable, as the graphic indicates.

To understand the pedagogical and advising challenges posed by these findings for college level educators, let us consider the Systematicity data and the Truth-seeking data for the 587 student sample. The range and frequency of scores on the Systematicity and Truth-seeking scales can be displayed as "mountains" which we would prefer to see moved to the right of the 40 demarcation line in the graphics presented below. The Systematicity mean hovering right around 40 (at 40.30) can mislead us with regard to the number of students who display the inclination toward being unfocused, disorganized, and lacking in intellectual perseverance. This is more evident on the Truth-seeking mountain, where the preponderance of students show that they prefer not to ask hard questions, they are not inclined to seek best knowledge, and they do not intent to permit evidence and reason to have an impact on their cherished beliefs of points of view. When juxtaposed with the findings on the Open-mindedness scale we see that college students appear to be tolerant toward the views of others with the tacit understanding that such tolerance will be shown to them as well. In this culture one may bypass reason and inquiry!





The Systematicity scale invites students to agree or disagree with eleven statements, three examples of which are:

- I always focus the question before I attempt to answer it.
- My opinion about controversial topics depends a lot on who I talk to last.
- My problem is I'm easily distracted.

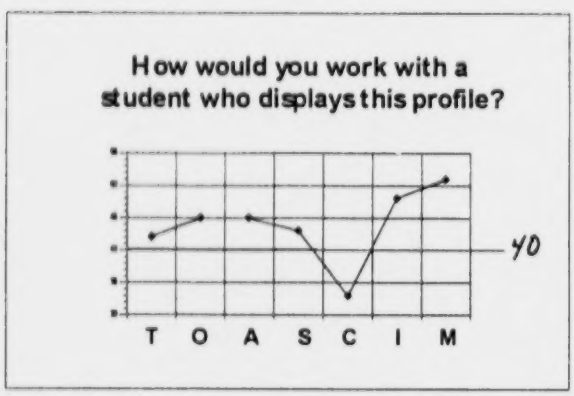
The Truth-seeking scale invites students to agree or disagree with twelve statements, five examples of which are:

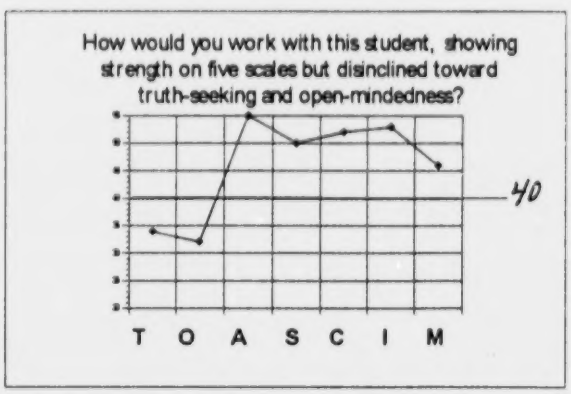
- To get people to agree with me I'd give any reason that worked.
- I look for facts that support my views, not facts that disagree.
- Everyone always argues from their own self-interest, including me.
- If there are four reasons in favor and one against, I'll go with the four.
- Many questions are just too frightening to ask.

Perhaps a reason for agreeing with each of these statements and, thus, indicating one's inclination away from truth-seeking is revealed to us mortals from the perspective of Anne Rice's fictional character, Marius the Vampire:

> "Very few really seek knowledge in this world. Mortal or immortal, few really ask. On the contrary, they try to ring from the unknown the answers they have already shaped in their own minds -- justifications, explanations, forms of consolation without which they cannot go on. To really ask is to open the door to the whirlwind. The answer may annihilate the question and the questioner." (Rice, 1985.)

Profiles of individual students provide interesting case studies for faculty to consider, in conjunction with other sources of data about each specific student, for purposes of advising and mentoring students. For example, the two individual profiles below -- again, when joined with other sources of data about these persons -- would suggest that the two students involved, while they are both young men with strong academic backgrounds and solid college preparation, may be best served by different kinds of advice, encouragement, and motivational support.




How would you work with this student, showing strength on five scales but disinclined toward truth-seeking and open-mindedness?
40
T O A S C I M

The one student seems to need encouragement to be more confident and trustful of his own reasoning. The other may need to be supported with regard to his inquisitiveness and, thereby, challenged to

address his apparent intolerance. Perhaps after talking to this student it might become clear that he is not hostile toward inquiry, but afraid of what open inquiry might mean if it were to be directed toward the fundamental questions in his life.

In considering the implications of CCTDI findings for instruction and developmental academic advising, we must remember that a disposition is not a skill. There is a sharp conceptual and practical distinction which must be maintained between being inclined toward something and actually doing it. This is what wrestling with moral temptation, sloth, apathy and greed are about. A person may be inclined to do something well, but not know how or not be able to do it. A person may do something well, but not out of an inclination or desire, but be acting either mindlessly or perhaps under threat or coercion. If human beings were not capable of drawing and maintaining the line between our tendencies, abilities, and behaviors, then virtue and vice would have no meaning, ethics would be irrelevant, and much of human society would be even more bestial and violent than we already find it to be.

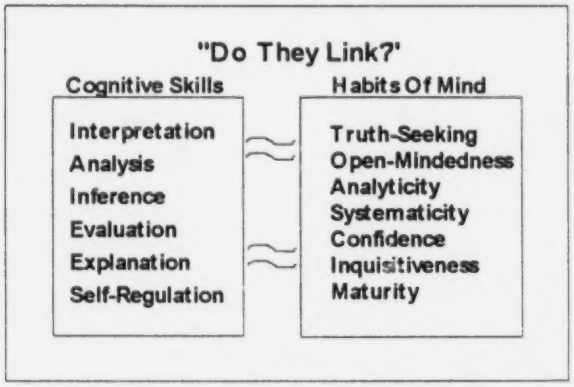
Hence, it remains to be determined whether a stronger tendency toward cognitive maturity (judiciousness) in college students predicts greater skill at making mature judgments. A stronger inclination toward analyticity may or may not predict greater analytic skills. Strength in a given dispositional attribute indicates that a person in more inclined to use what skills he or she may have, while opposition to a given aspect of the overall disposition toward CT suggests that a person would be inclined not to use his or her skills, even if they were considerable.

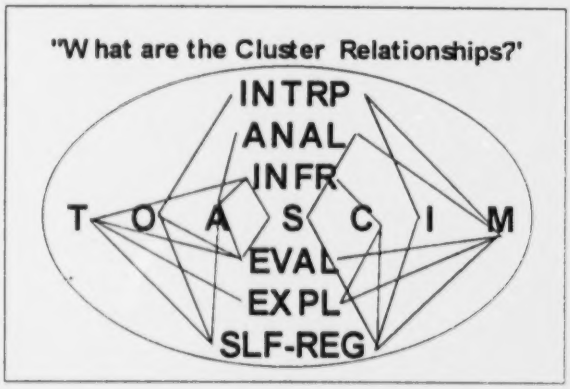
Future Research: Four Questions

1. What is the relationship between the disposition toward CT and CT ability? The question "Is the *ability* to think critically an outcome of a college education?" is a different question than "Is the *disposition* to think critically an outcome of a college education?" As with so many person-characteristics, it may be the case that we will not find direct behavioral manifestations of a person's disposition toward CT. It might happen that CT abilities and the disposition toward CT are strongly correlated at the higher end of the spectrum, but not correlated significantly in persons with lower skill or disposition levels. Or, perhaps more in keeping with what experienced educators might predict, the correlations are stronger at the two ends of the spectrum, but not in the middle ranges.

The two graphics below suggest alternative theoretical possibilities. The one on the left is intended to indicate that the relationship might be holistic, in that the skills as a group might be related in some complex way to the set of dispositional dimensions taken as a group. The graphic on the right

suggests that the relationships might turn out to be clusters wherein one or more specific skills is closely associated with one or more specific dispositional dimensions. Rather than *a priori* speculations on the nature of this relationship, empirical analyses will guide the resolution to this question.

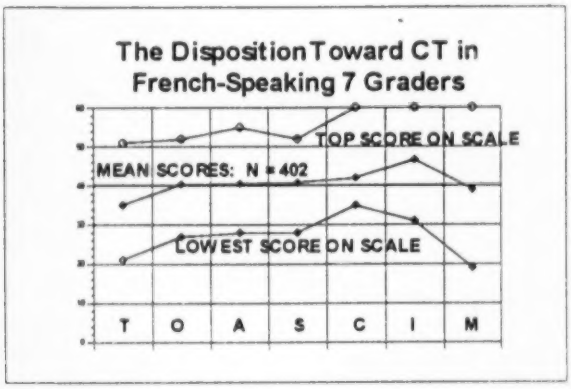




2. What is the relationship between the disposition toward CT and learning? The measurement of the disposition toward CT opens new and fertile areas for psychological development and educational research. Among the more straightforward educational research questions to explore are the relationships between the disposition toward CT and a variety of traditional educational variables such as age, grade level, gpa, mathematical ability, verbal ability, reading comprehension level, and the like. Of significant interest as well are how various dispositional profiles might relate to selection of academic major or career objective, success in collaborative or individual learning contexts, and student preferences for various instructional modalities and learning styles.

The impact of culture on learning and education is well known. How the disposition toward CT is manifest in different aged students and in different cultures could be of major significance in our understanding of how students will respond to efforts to introduce CT pedagogy and CT skill education in those cultures. A study using the CCTDI was conducted during 1993/94 of seventh grade science students in French speaking Quebec. For the purposes of this study the investigator, Nichole Ferguson, used a French translation of the instrument which reduced student Likert scale options from 6 to 4. The graphic below profiles the mean score for this sample of 402 boys and girls, it also reports the range of scores by showing the top score and the bottom score on each scale. This data suggests that the some of the same weakness in truth-seeking and strength in inquisitiveness we see in the college samples. Another research project which crosses language and culture lines is underway at this time using a

Spanish language version with native Spanish speaking high school students in Arizona.


The Disposition Toward CT in
French-Speaking 7 Graders
TOP SCORE ON SCALE
MEAN SCORES: N = 402
LOWEST SCORE ON SCALE
T O A S C I M

3. How does CT and the disposition toward CT relate to civic and professional life? At this point how the disposition toward CT relates to career and academic success is unknown? One would surmise that the relationship would be strong and positive. If so, then nurturing the disposition would be an important element in the curriculum of professional programs and liberal education programs alike. How, for example, does the general education program impact the development of the disposition toward CT? Does the program increase open-mindedness, cognitive maturity, and truth-seeking, or might it stunt these or other dimensions of this disposition? And, are these the kinds of characteristics we expect an educational system to foster. In some societies and cultures the answer to this might be a resounding No! To foster CT and the disposition to use CT might be seen as a significant threat.

CT is a subversive activity. It is the liberating force in a liberal education. Unlike those educational systems which are built on the assumption that the truth is already known, a CT based curriculum is built on the assumption that we should teach students how to think, not what to think. CT empowers people to challenge all manner of assumptions, and to subject official explanations to independent evaluations. Understanding that CT empowers people to reason for themselves, scientists seeking a defense against fascist propaganda in the first half of this century advocated the introduction of CT into the K-12 educational system as a defensive strategy, (Osborn, 1939). But once unleashed, CT may or may not support the views of the politically correct nor serve the interests of the powers that be.

At an intuitive level the disposition toward CT seems evident in the exercise of clinical judgment, management decision making, and effective leadership, and successful participation in a democratic society. A conceptual analysis of professional judgment indicates it is comprised of (a) content knowledge

of the information, criteria, and methods of a given field, (b) experiential knowledge of the scripts and strategies involved in professional practice, and (c) the disposition and ability to use CT to make sound, informed, reasoned, purposeful, and reflective professional judgments. If this is the case, then pedagogical strategies to foster the disposition toward CT and use that disposition to nourish students' CT skills will be sought by education programs at all levels which embraces the development of professional leadership and good judgment as among their foremost goals. Advocacy of these intuitions about education and its place in developing human resources is as high as ever.

> "The future now belongs to societies that organize themselves for learning. Nations that want high incomes and full employment must develop policies that emphasize the acquisition of knowledge and skills by everyone, not just a select few." (Marshal & Tucker, 1992)

4. How does the disposition toward CT relate to general intelligence, human growth and development, and other psychological constructs? The relationships between the various CT dispositional attributes and metacognition, as well as an array of personality variables has just begun to be examined. Recently the disposition toward CT, as measured by the CCTDI scales, was found to be significantly related to ego-resiliency, which refers to a person's ability to alter their modal perceptual and behavioral functioning to adapt to situational constraints, that is, being a flexible and adaptable person (Block & Block, 1980). Ego-resiliency, can be viewed as a continuum, high scorers on ego-resiliency are referred to as ego-resilient, and low scorers referred to as ego-brittle (Block & Block, 1980). The ego-resilient person is resourceful, flexible, engaged in their surroundings, and able to modify their responses in line with situational requirements. The ego-resilient person is not only flexible interpersonally, but cognitively as well, with several problem-solving strategies available to them when faced with difficult tasks. The ego-brittle person is not able to vary his or her roles, is not resourceful and is not as capable at handling stressful situations (Block & Block, 1980). Sánchez (1993) found that all seven of the CCTDI scales were positively correlated with a measure of ego-resiliency. The highest correlates were with systematicity ($r=.47$, $N=200$, $p<.001$), truth-seeking ($r=.41$, $N=200$, $p<.001$) and inquisitiveness, ($r=.39$, $N=200$, $p<.001$) indicating that ego-resiliency was most highly associated with the focused diligence, objectivity, and intellectual curiosity of the CT cognitive style. Questions regarding the stability of the disposition toward CT across stages of development and times of life are just beginning to be asked. As findings become more available, testable hypotheses regarding effective ways to nurture the disposition toward CT can begin to be examined. Researchers seeking to measure CT have cleared a near horizon only to discover that a vastly richer, unexplored, and exciting territory lies before them.

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